



Public health impacts of climate change in Washington State: Projected mortality risks due to heat events and air pollution

Author(s): Jackson JE, Yost MG, Karr C, Fitzpatrick C, Lamb BK, Chung SH, Chen J, Avise J, Rosenblatt RA, Fenske RA
Year: 2010
Journal: Climatic Change. 102 (2-Jan): 159-186

Abstract:

Illness and mortality related to heat and worsening air quality are core public health concerns associated with climate change projections. We examined the historical relationship between age- and cause-specific mortality rates from 1980 through 2006 and heat events at the 99th percentile of humidex values in the historic period from January 1, 1970 to December 31, 2006 in the greater Seattle area (King, Pierce and Snohomish counties), Spokane County, the Tri-Cities (Benton and Franklin counties) and Yakima County; the relative risks of mortality during heat events were applied to population and climate projections for Washington State to calculate number of deaths above the baseline (1980-2006) expected during projected heat events in 2025, 2045 and 2085. Three different warming scenarios were used in the analysis. Relative risks for the greater Seattle area showed a significant dose-response relationship between heat event duration and daily mortality rates for non-traumatic deaths for persons ages 45 and above, typically peaking at four days of exposure to humidex values above the 99th percentile. The largest number of projected excess deaths in all years and scenarios for the Seattle region was found for age 65 and above. Under the middle warming scenario, this age group is expected to have 96, 148 and 266 excess deaths from all non-traumatic causes in 2025, 2045 and 2085, respectively. We also examined projected excess deaths due to ground-level ozone concentrations at mid century (2045-2054) in King and Spokane counties. Current (1997-2006) ozone measurements and mid-twenty-first century ozone projections were coupled with dose-response data from the scientific literature to produce estimates overall and cardiopulmonary mortality. Daily maximum 8-h ozone concentrations are forecasted to be 16-28% higher in the mid twenty-first century compared to the recent decade of 1997-2006. By mid-century in King County the non-traumatic mortality rate related to ozone was projected to increase from baseline (0.026 per 100,000; 95% confidence interval 0.013-0.038) to 0.033 (95% CI 0.017-0.049). For the same health outcome in Spokane County, the baseline period rate of 0.058 (95% CI 0.030-0.085) was estimated increase to 0.068 (95% CI 0.035-0.100) by mid-century. The cardiopulmonary death rate per 100,000 due to ozone was estimated to increase from 0.011 (95% CI 0.005-0.017) to 0.015 (0.007-0.022) in King County, and from 0.027 (95% CI 0.013-0.042) to 0.032 (95% CI 0.015-0.049) in Spokane County. Public health interventions aimed at protecting Washington's population from excessive heat and increased ozone concentrations will become increasingly important for preventing deaths, especially among older adults. Furthermore, heat and air quality related illnesses that do not result in death, but are serious nevertheless, may be reduced by the same measures.

Source: <http://dx.doi.org/10.1007/s10584-010-9852-3>

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Meteorological Factors, Temperature

Air Pollution: Interaction with Temperature, Ozone, Particulate Matter

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

United States

Health Impact:

specification of health effect or disease related to climate change exposure

Cardiovascular Effect, Morbidity/Mortality, Respiratory Effect

Cardiovascular Effect: Other Cardiovascular Effect

Cardiovascular Disease (other): cardiovascular disease mortality; circulatory disease mortality

Respiratory Effect: Other Respiratory Effect

Respiratory Condition (other) : respiratory disease mortality

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation


Model/Methodology:

type of model used or methodology development is a focus of resource

Climate Change and Human Health Literature Portal

Outcome Change Prediction

Population of Concern: A focus of content

Population of Concern: 

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: 

format or standard characteristic of resource

Research Article

Timescale: 

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: 

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content